GUIDE DEVICE FOR AUTOMOBILE SEATBELT

The disclosure of Japanese Patent Application No. 2002-370725 filed on December 20, 2002 including the specification, drawings and abstract is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention relates to a guide device of an automobile seatbelt for guiding a seatbelt drawn out from a retractor.

2. Related Art Statement

In recent years, there is a tendency to employ a three-point type seatbelt device also to a rear seat of vehicles such as automobiles and the like to improve the safety of passenger. As shown in FIG. 9, a shoulder belt, which is used in station wagons and the like to hold the chest of the passenger, is arranged such that a seatbelt (shoulder belt) 21 drawn out from a retractor 20 is attached by folding back with a sash guide stay 23 across a rear quarter glass 22.

Although this type of the sash guide stay 23 is disclosed as a shoulder anchor for a vertically adjusting mechanism in Japanese Unexamined Utility Model Application

Publication No. 7-13619, it is not necessarily preferable for outside appearance because it is exposed to the side of a compartment.

In contrast, Japanese Unexamined Patent Application Publication No. 11-198755 discloses a seatbelt guide (guide device) disposed at a center portion of a rear tray although it is installed for a sedan type, and when this seatbelt guide is installed in the station wagon in the same manner, the good appearance of the compartment of the station wagon can be attained.

However, when the device disclosed in Japanese Unexamined Patent Application Publication No. 11-198755 is installed along a body side, not only the weight of the device increases with the size increase of the components constituting the device to secure strength but also a design freedom of layout is reduced. In particular, since the space behind the rear seat is used as a baggage room in the station wagons, the space in which the device can be installed is limited, and thus it is more important to reduce the weight and the size of the device and to increase the design freedom.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide a guide device for an automobile seatbelt capable of

reducing a cost by realizing the reduction in size and weight of the guide device as well as capable of improving a design freedom of a layout while securing a required strength.

A brief explanation is as follows: the seatbelt guide device for an automobile according to the present invention guides a seatbelt drawn out of a retractor and comprises a main rod having a guide portion formed thereto for suspending and folding back a seatbelt and folds back the seatbelt, and an auxiliary rod for dispersing a load applied to the main rod, and the main rod and the auxiliary rod are restrained each other and secured to a vehicle body.

The other features and advantages of the present invention will become sufficiently understood from the following explanation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view explaining a periphery of a rear quarter of an automobile according to a first embodiment of the present invention;

FIG. 2 is a perspective view showing an arrangement of a seatbelt guide device according to the first embodiment;

FIG. 3 is a side elevational view of the seatbelt guide device according to the first embodiment;

FIG. 4 is a view in a direction of the arrow line A in

FIG. 3.

FIG. 5 is the view in the direction of the arrow line B in FIG. 3.

FIG. 6 is a perspective view showing the arrangement of the seatbelt guide device according to a second embodiment of the present invention;

FIG. 7 is the perspective view showing the arrangement of the seatbelt guide device according to a third embodiment of the present invention;

FIG. 8 is the perspective view showing the arrangement of the seatbelt guide device according to a fourth embodiment of the present invention; and

FIG. 9 is the view explaining a folded back state of a conventional seatbelt.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1, reference numeral 1 denotes a rear quarter trim disposed behind a rear seat of an automobile (not shown), and a known retractor 3 is disposed in the rear quarter trim 1 to wind a base end of a seatbelt 2 (shoulder belt) and to accommodate the seatbelt 2 into the rear quarter trim 1. The seatbelt 2 drawn out of the retractor 3 is guided through a seatbelt guide device 4 disposed in the rear quarter trim 1, extended from a belt extract unit 6 which is disposed on the rear quarter trim 1 at the lower

end of a rear quarter glass 5, and coupled with a waist belt through a tongue (not shown).

In this embodiment, the seatbelt guide device 4 has a structure by combining a small bracket fixedly secured to a vehicle body and a rod, and has a required strength while reducing its weight. The seatbelt guide device 4 has a function for folding back the seatbelt 2 drawn out of the retractor 3 as well as reducing a load applied to the vehicle body by dispersing the load transmitted from the seatbelt 2.

More specifically, as shown in FIGS. 2 and 3, the seatbelt guide device 4 comprises mainly brackets 7, 8, 9 and rods 10, 11, 12. Each of the brackets 7, 8, 9 is formed by a sheet metal and secured to the vehicle body by bolts (not shown), and each of the rods 10, 11, 12 is formed by bending a metal rod member having a predetermined diameter. The respective rods 10, 11, 12, 13 are fixedly secured to the brackets 7, 8, 9 by welding and the like and restrained each other (except the rod 12 as described below) to secure a required strength.

The important structure is that the rod 10 corresponds to a first rod of the present invention, the rod 11 corresponds to a third rod of the present invention, and the rod 13 corresponds to a second rod of the present invention. Further, in FIG. 3 showing a side elevational view, a

bracket 7 side shows the upper direction of the vehicle body, and a bracket 9 side shows the front side thereof.

The bracket 7 is a slender bracket having holes, which are formed at both ends thereof and through which the bracket 7 is attached to the vehicle body, and a rib-shaped bent portion formed at approximately the center thereof. An end portion of the rod 10 is fixedly secured to the bent portion, and the end portion of the rod 11 is fixedly secured to the bracket 7 in the vicinity of the rod 10.

The rod 10 is a main rod constituting the main portion of the seatbelt guide device 4 and has an arc-shaped webbing guide portion 10a formed thereto. The webbing guide portion 10a is formed by bending the metal rod member and folds back and guides the seatbelt 2. The end portion of the webbing guide portion 10a is fixedly secured to the bracket 7, and the base end of the rod-shaped straight portion thereof is secured to the bracket 8. Likewise, the rod 11 is also formed by bending the straight metal rod member to a shape approximately similar to that of the webbing guide portion 10a. The end portion of the rod 11 is fixedly secured to the bracket 7, and the base end of the rod-shaped straight portion thereof is fixedly secured to the bracket 8 together with the rod 10.

The bracket 7 is disposed to a portion (first portion) of the vehicle body facing the retractor 3 so that the

webbing guide portion 10a of the rod 10 fixedly secured to the bracket 7 faces a desired belt folding back direction, and the straight portions of the rods 10 and 11 are extended in a direction obliquely intersecting the upper surface of the seatbelt 2. The base ends of both the rod 10 and 11 are supported by the bracket 8 which is attached to a portion (second portion) of the vehicle body between the bracket 7 and the retractor 3. That is, the rod 11 is an auxiliary member for dispersing the load applied to the rod 10 and suppressing the deformation of the bracket 7.

The bracket 8 has two rib-shaped projections disposed approximately in parallel with each other on both the sides of an attachment hole defined approximately at the center of the bracket 8, through which it is attached to the vehicle body, and the base ends of the rods 10 and 11 are fixedly secured to the back surfaces of the respective projections. Further, a reinforcement member 14 formed of a thin sheet metal is wound around and fixedly secured to the straight portions of the rods 10 and 11 extending from the bracket 8 so that the rods 10 and 11 are prevented from falling down in an open direction by the reinforcement member 14 acting as a support member for coupling the rod 10 with the rod 11.

In contrast, the approximately L-shaped rod 12 is used to prevent the seatbelt 2 from being removed from the webbing guide portion 10a to the retractor 3 side. The rod

12 is disposed approximately in parallel with the bracket 7 with end portion thereof in a lateral direction fixedly secured to the outer periphery of the bent portion of the rod 10 located between the straight portion and the webbing guide portion 10a thereof (refer to FIG. 4), and the other end of the rod 12 is opened.

In this case, since the rod 12 is provided to prevent a removal of the seatbelt 2 from the webbing guide portion 10a as described above, it does not necessarily have the rod member, and the removal of the seatbelt 2 may be prevented by covering the webbing guide portion 10a with a resin cover and the like in place of the rod 12.

Further, the end portion of the rod 13 is abutted against and fixedly secured to the inside of the bent portion of the rod 10 located between the straight portion and the webbing guide portion 10a thereof (refer to FIG. 5), and the base end of the rod 13 is fixedly secured to the end of the bracket 9 (the end opposite of an attachment hole to the vehicle body) disposed to a portion (third portion) of the vehicle body in the vicinity of the bracket 8. The rod 13 is an auxiliary member for supporting the rod 10 from under the webbing guide portion 10a so as to prevent the rod 10 from falling down in the front direction of the vehicle body when a load is applied thereto.

Note that it is preferable that the portions of the

rods 10, 11, 12, with which the seatbelt 2 comes into contact, are covered with resin covers or coated with a resin material, thereby the winding property of the seatbelt 2 can be improved.

In the seatbelt guide device 4 arranged as described above, the seatbelt 2 extract from the retractor 3 is extended from under the base portions of the rods 10 and 11 to the webbing guide portion 10a of the rod 10. Then, the seatbelt 2 is suspended and folded back in a predetermined direction by the webbing guide portion 10a, and extended from the belt extraction unit 6 of the rear quarter trim 1. The seatbelt 2 extended from the belt extraction unit 6 is combined with, for example, a waist seatbelt (not shown) and constitutes a three-point type seatbelt. With this arrangement, the chest of a passenger is securely held by the seatbelt 2 drawn out of the belt extract unit 6 as well as the waist of the passenger is held by the waist belt (not shown).

At this time, although the seatbelt 2 contacts the webbing guide portion 10a of the rod 10 and a load is applied thereto, the seatbelt 2 fits in the arc shape of the webbing guide portion 10a and is prevented from slipping down as well as the load is dispersed by the three rods 10, 11, 13. Accordingly, even if an impact acts on the seatbelt 2, since the impact is received by the rods 10, 11, 13 in a

dispersed state, it is possible to prevent the concentration of the load due to the impact to the portions of the vehicle body through which the rods 10, 11, 13 are attached thereto. Accordingly, it does not necessarily provide large brackets with the vehicle body to attach the rods thereto.

Further, the load can be transmitted to the vehicle body under desirable optimum conditions which are set according to the restraining conditions of the respective rods in consideration of the load received from the seatbelt 2, the radii, the bent shapes, the materials and the span lengths of the respective rods 10, 11, 13, the positions of the vehicle body at which the rods are attached to the vehicle body, the shapes of the attachment positions, and the like. As a result, the load applied to the vehicle body can be reduced as well as a required strength can be secured also with respect to the vibration received from the vehicle body, thereby the durability of the rods 10, 11, 13 can be improved.

Since the seatbelt guide device 4 in this embodiment is arranged by using the small and light brackets 7, 8, 9 formed of the sheet metal and the rods 10, 11, 12, 13 formed by bending the easily available rod member, the weight and the cost of parts can be reduced while securing the strength and a belt folding back function.

Moreover, since a degree of a design freedom of a

layout is increased by the reduction in size and weight of the parts, it does not necessarily provide a guide stay and the like in a compartment to fold back the seatbelt by accommodating the retractor 3 and the seatbelt guide device 4 in the rear quarter trim 1, which contributes to the improvement of the seatbelt guide device 4 as a commercial commodity without spoiling its good appearance in the compartment.

Next, a second embodiment of the present invention will be explained. FIG. 6 is a perspective view showing the arrangement of a seatbelt guide device according to the second embodiment of the present invention.

The second embodiment simplifies the arrangement of the seatbelt guide device 4 of the first embodiment described above by omitting the rod 11 and the reinforcement member 14 used therein. That is, since the rod 11 is used to disperse the load applied to the rod 10 and the reinforcement member 14 is used to prevent the rods 10 and 11 from falling down in the open direction as described above, even if the rods 10 and 11 are omitted, the strength of the overall seatbelt guide device 4 is not largely affected thereby. Accordingly, a lighter and less expensive seatbelt guide device can be realized by omitting these rods.

As shown in FIG. 6, the seatbelt guide device 4A of the second embodiment comprises a bracket 8A, the brackets 7 and

9, and rods 10, 12 and 13 by omitting the rod 11 and the reinforcement member 14. The bracket 8A is a modification of the bracket 8 and has a smaller size than that of the bracket 8. The bracket 8A is formed in a shape obtained by removing the rib-shaped projection for securing the rod 11 from the bracket 8 of the first embodiment, and the relationship between the brackets 7, 8A, 9 and the rods 10, 12, 13 is approximately the same as that of the first embodiment except that the load from the seatbelt 2 is dispersed to the rods 10 and 13.

In the second embodiment, the size of the bracket 8A can be made smaller than that of the bracket 8 in the first embodiment described above by omitting the rod 11 and the reinforcing member 14. Accordingly, not only the weight and the cost of the seatbelt guide device 4 can be more reduced but also the winding property of the seatbelt can be maintained in a good state even if a layout is such that the distance from a belt folding-back portion to the retractor 3 is short and the seatbelt 2 is twisted by reducing the number and the size of parts.

Next, a third embodiment of the present invention will be explained. FIG. 7 is a perspective view showing the arrangement of a seatbelt guide device 4B according to the third embodiment of the present invention.

In the third embodiment, the number of parts is reduced

by integrating the rod 12 with the rod 13. That is, the seatbelt guide device 4B of the third embodiment shown in FIG. 7 is provided with a rod 15 in place of the rod 13 used in the seatbelt guide device 4, and the end portion of the rod 15 is extended so that the end portion thereof also performs the function of the rod 12.

More specifically, the rod 15 is formed in an L-shape similar to that of the rod 12 by extending the end portion of the rod 13 that is fixedly secured to the inside of the bent portion of the rod 10 located between the straight portion and the webbing guide portion 10a thereof, and the L-shaped portion of the rod 15 forms an easy disconnection preventive portion 15a for preventing from unexpectedly removing the seatbelt 2 from the webbing guide portion 10a.

With the above arrangement, the third embodiment can achieve a further cost reduction by more reducing the number of parts while maintaining an excellent operational easiness similar to that of the second embodiment because it is not necessary to separately provide the rod 12.

It is needless to say that the rod 15, which also performs the function of the rod 12, may be applied to the seatbelt guide device 4 of the first embodiment.

Next, a fourth embodiment of the present invention will be explained. FIG. 8 is the perspective view showing the arrangement of the seatbelt guide device according to the

fourth embodiment of the present invention.

In the fourth embodiment, brackets for securing rods to the vehicle body are eliminated, and FIG. 8 shows an example that the fourth embodiment is applied to the seatbelt guide device 4B of the third embodiment to eliminate the brackets 8A and 9.

The seatbelt guide device 4C shown in FIG. 8 eliminates the bracket 8A by using a rod 16 of which base end is modified to permit the rod 16 to be directly fixed to the vehicle body in place of the rod 10 which is fixedly secured to the vehicle body through the bracket 8A. Further, the seatbelt guide device 4C eliminates the bracket 9 by using a rod 17 of which base end is modified to permit the rod 17 to be directly fixed to the vehicle body in place of the rod 15 which is fixedly secured to the vehicle body through the bracket 9.

That is, the rod 16 includes a webbing guide portion 16a and a vehicle body attachment portion 16b. The webbing guide portion 16a is formed in the same shape as that of the webbing guide portion 10a of the rod 10, and the vehicle body attachment portion 16b is formed by molding the end portion of the rod 16 at the base end thereof to make flat by a press (or forging) machine and the like, and an attachment hole is drilled therethrough. The webbing guide portion 16a is fixedly secured to the bracket 7 at the end

portion thereof by welding and the like, and the vehicle body attachment portion 16b on the base end thereof is directly attached and secured to the vehicle body by a bolt and the like.

Further, the rod 17 includes an easy disconnection preventive portion 17a and a vehicle body attachment portion 17b. The preventive portion 17a is formed in the same shape as that of the preventive portion 15a of the rod 15, and the vehicle body attachment portion 17b is formed by molding the end portion of the rod 17 at the base end thereof to a flat shape by the press (or forging) machine and the like, and the attachment hole is drilled therethrough. The base portion of the removal preventing portion 17a is fixedly secured to the inside of the bent portion of the rod 16 continuous to the webbing guide portion 16a thereof by welding and the like, and the vehicle body attachment portion 17b at the base end of the rod 17 is directly attached and secured to the vehicle body by the bolt and the like.

With this arrangement, not only the size and the weight of the seatbelt guide device 4C can be more reduced by further reducing the number of parts but also the degree of design freedom of the layout can be more increased by reducing a space in which the seatbelt guide device 4C is installed.

It is also possible to eliminate the bracket 7 by forming the end portion of the webbing guide portion 16a of the rod 16 in the same shape as that of the vehicle body attachment portion 16b on the base end thereof. In this case, the seatbelt guide device can comprise only two rods without using any bracket.

As described above, in these embodiment, since the main rod, in which the guide portion is formed to suspend and fold back the seatbelt, and the auxiliary rod for dispersing the load applied to the main rod are restrained each other and secured to the vehicle body, the seatbelt guide device can be reduced in size and weight while securing the required strength, and the cost of the device can be reduced as well as the degree of design freedom of the layout of it can be improved.

In the present invention, different embodiments can be arranged in a wide range based on the invention without departing from the spirit and the scope of the present invention. The present invention is by no means restricted by any particular embodiments thereof except that it is restricted by the accompanying claims.